M-LEARNING PILOT AT SOFIA UNIVERSITY

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ABSTRACT

Many universities have designed specialized Learning Management Systems in order to facilitate the management of education, the access to knowledge and educational resources, and the communications with all stakeholders involved. With the wide spread of mobile technologies nowadays, new challenges emerge for adapting the available systems to the demands of mobile users. The authors present the results of a pilot project of the Department of Software Engineering of Sofia University, Bulgaria, aimed at adapting to the challenges of m-learning.

KEYWORDS

Learning management systems, m-learning, students feedback

1. INTRODUCTION

Last decades are characterised by radical changes in Information and Communication Technologies (ICT) and the emergence of the phenomenon of 'ubiquitous computing' whereas people have access to knowledge and information at any time and everywhere regardless of the device used. Subsequently, deep changes have appeared in the economy and society, and the everyday life of people. The new generations grow with digital devices and gain ICT users' skills at very early age. Therefore, present day students show preference to all forms of distance education available, despite of devices used (Gourova et al, 2013). Mobile learning (m-learning) offers new opportunities for distance education due to the rapid development of wireless communications and the availability of various portable devices. The mass usage of mobile technologies is a reason for the growing popularity of m-learning world-wide (Sampson et al, 2013). At the same time, several challenges emerge for redesign of educational materials and learning standards to suit better the m-learning requirements. The Department of Software Engineering (DSE) of Sofia University (SU) acknowledges the emerging educational and technological trends and tries to provide up-to-date working and learning environment for its staff and students. DSE recently launched deep changes in its web site in order to better suit mobile users, and offered a pilot m-learning to its Master (MSc) students.

The goal of this paper is to present the results of a project launched at DSE. Initially, the DSE problems in providing a Learning Management System (LMS) for its students are outlined, and a concept for solving them is presented. Second, the paper shows the project results after introducing m-learning at DSE, and the students' reflection on the new educational form offered.

2. M-LEARNING DESIGN CONCEPT

DSE provides on its web site public access to its educational resources at Bachelor and Master levels, and information for its activities and educational requirements. A system for Thesis management is accessible from a closed area of the site, as well as internal resources of the staff. In addition, DSE staff uses the common resources of SU, including access to international research data bases provided by SU library, and different web-based systems – for education management ("SUSI"), project management, research publications management (named "The Authors"), and different Moodle platforms. All these systems are

installed at different servers and the users need to remember several URLs in order to access them. SU web sites do not provide links to all these systems and single sign in to all resources. Subsequently, despite of all efforts made, DSE faces the need to redesign its web site in order to facilitate the access to the information and knowledge available in all common systems, as well as to ensure user-friendly navigation and visualization of information not only on desktop computers, but also on mobile devices. Therefore, DSE started to assess all resources available on its web site and used by its staff and students, and investigated how to improve their organization, accessibility and visualization on different devices.

Another group of problems which DSE faces concerns the provision of new forms of distance education, namely m-learning. Therefore, it launched a pilot project with a goal to design an integrated m-learning environment for DSE students, accessible via its web site.

For the redesign of DSE web site were taken into account the features of LMS, as well as SU working processes. It was considered the need to ensure scalability, knowledge reuse, efficient searching and retrieval, as well as to provide an intuitive interface and a single entry point to all SU knowledge and administrative resources. It was ecided that the web site should facilitate the following activities:

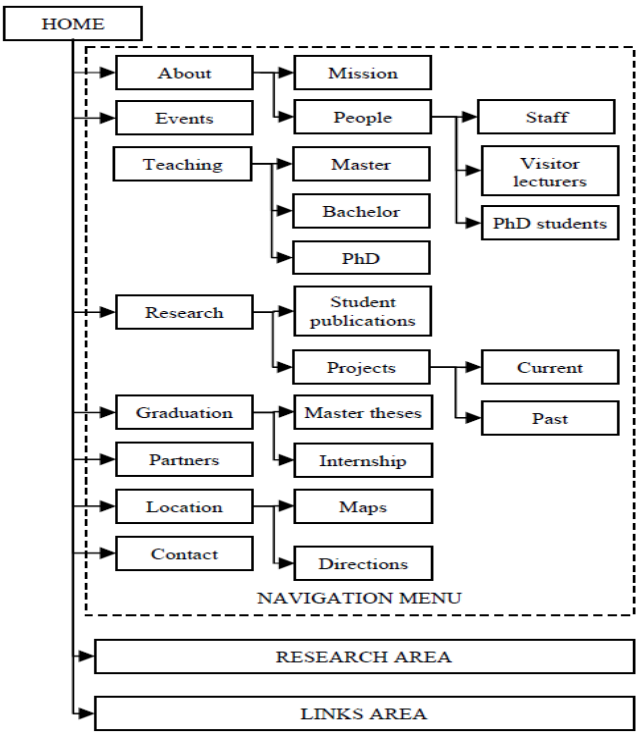
- *Educational activities* – programmes and courses, lecturers, schedules, students' management, students' evaluation, thesis preparation, mobility exchanges;
- *Research activities* – existing scientific infrastructure (labs and equipment, scientific data bases, information flows), project management, intellectual products management, knowledge and technology transfer, collaboration with industry and other stakeholders, scientific supervision and mentoring;
- *Human resources management* – recruitment, monitoring and control, staff assessment and career development, awarding, and teachers' mobility;
- *Administrative management* – planning and reporting, accreditation, resources management.

The concept for the mobile version of the web site was based on well-known requirements for software systems design with mobile access (Ardito et al, 2006; Magal-Royo et al, 2007). The mobile version of the site preserves the former content and resources organisation, however, follows some basic principles:

- Site structure improvement with the aim of more effective, easy and fast access;
- Updating and enhancing content with the aim of its higher informativeness;
- Optimization of the visual users interface with the objective of easy access via different devices;
- Effective web site internationalization in order to easy add new languages.

3. IMPLEMENTATION RESULTS

On bases of the design principles adopted in the concept, the web site was designed with a three-layer interface including: navigation menu, tabular area and links area (Figure 1). The tabular area provides quick access to all research topics of interest for DSE staff. Thus, the web site visitors can navigate easily to different research activities and projects. The links area includes a set of hyperlinks to the common online resources used by lecturers and students (e.g. e-learning system, students' administration system, research database, SU staff research and publications data). They are divided in three main groups: institutions, systems and libraries. As the web site concept envisages effective access abilities by both, mobile devices (phones and tablets) and desktop computers, the DSE team designed one responsive web site that scales across a wide range of screen sizes built on top of jQuery library, HTML5 (HyperText Markup Language) and CSS3 (Cascading Style Sheets). It was also taken into account that the web sites for large screens typically use left or top menus which are not visualized properly on smaller screens. Therefore, using the jQuery library, a dynamic web site menu was implemented which provides quick access to the content. When the browser window is narrow, the navigation in the top pane of the web site converts from a regular three level menu into a dropdown menu. Thus, the users can access easily the menu elements without a need to scroll the web site. Similar transformations are provided for the other web site elements located in the tabular area and links area. As shown on Figure 2, all web site elements like images, titles, texts, etc. are dynamically rearranged when the width of the browser window is reduced (Petrova-Antonova et al., 2013).



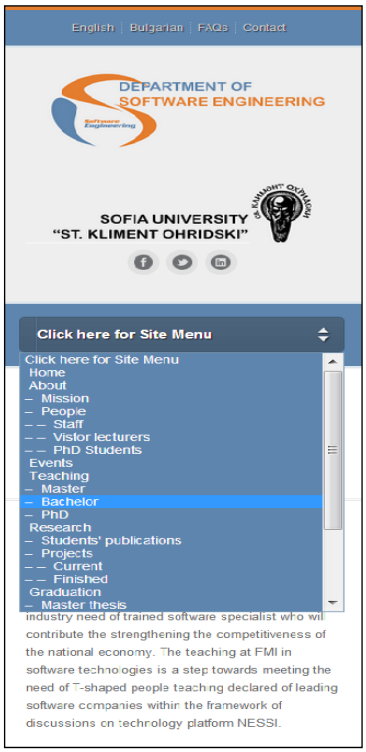


Figure 1. Web site map (Petrova-Antonova-et al., 2013) - Figure 2. Mobile web site menu (Petrova-Antonova-et al., 2013)

The team decided to test m-learning within one MSc course. The questionnaire sent to the students aimed to obtain feedback on educational content and format, and generally on m-learning as a new distance learning opportunity. It is interesting to note that the respondents showed a clear preference of Android (47%) as an operating system of the mobile device, followed by Windows (33%), iOS (5%) and Linux (15%). Students like the opportunity for using mobile devices in distant education, however, they are still not ready to carry out all self-learning activities and interactive communications just in mobile LMS environment. According to the students, key factors for m-learning success are the learners' attitude, the learning process organisation, and the technical opportunities in place. They considered the following opportunities of the mobile LMS:

- *regarding trainees:* to raise learning motivation (more active participation and higher interest to the course), to facilitate individualised learning, to raise awareness of trainees on advanced technology features, to ensure stable and continuous link between users and the learning environment;
- *regarding learning process organisation:* conditions for individualisation and differenciation are in place (38%), better knowledge systematisation opportunities (56%), fast internal assessment of learning results and students' tests (46%), and self-control opportunities (37%);
- *regarding technical features:* availability of fast access to students data, learning modules and assessment results (14%), better users' registration and access management (33%), maintenance of data accessible by trainees, e.g. trainees profile and tasks (29%), everyday monitoring and control by trainers of students performance (56%), learning tasks management using standard approaches and rules (60%), data gathering for students behaviour during the entire learning cycle (34%), standard analysis of learning results and meeting educational goals (84%).

The students feedback shows that m-learning provides a fully new educational design opportunity and environment for: educational materials' storage (23%), distance learning (52%), interactivity on study topics (28%), active students' communications (60%), interactive seminar classes (43%), joint projects work (72%), and online access to educational materials (93%).

Generally, the survey results and the pilot m-learning provide some insight on the new educational forms available, which could facilitate broader individual development, and assist building different competences, skills and personal capabilities on bases of individual plan and learning speed.

4. CONCLUSION

The knowledge gained within the pilot mobile LMS design will be used for its improvement and wider application in the learning process of DSE. This is a base for realisation of new learning tools to be used behind formal education, and especially in courses for further qualification offered to employees providing them 24/7 flexible distance learning opportunities. The project impact is twofold – new forms of learning design are offered, and higher motivation and involvement of trainees in the educational process is achieved. At the same time, the changes of the DSE web site respond to the new technology challenges and facilitate the device-independent access and search of content by university staff and students, as well as enhance their communication opportunities in a user-friendly environment. A further challenge going beyond DSE team responcibilities is to disseminate the project experience and use it for updating other web resources at SU in order to overcome some existing gaps in content access and visualistaion on mobile devices.

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